

Practice: 590 - Nutrient Management

Scenario # 1 Basic NM

Scenario Description:

Missouri

This scenario describes the implementation of a basic nutrient management system on cropland or hayland (non-organic and organic) where there is no manure application. The planned NM system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients. Payment for implementation is to defray the costs of soil testing, analysis, consultant services that provide nutrient recommendations based on LGU recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Records demonstrating implementation of the 4 R's of the NM criteria will be required.

Before Practice Situation:

In this geographic area, a fertility program is either non existent or does not meet the 590 nutrient management standard. Soil testing is not completed on a regular basis and applications of fertilizers are not based on land grant university recommendations or a nutrient budget. An environmental evaluation or risk assessment is not completed. Nutrients are transported to surface waters through runoff or soil erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients.

After Practice Situation:

Plan Development▯ A nutrient management system will be developed to meet the NRCS 590 standard. ▯ The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation.▯ A nutrient management budget will be developed for each field(s) based on soil test analysis and land grant university recommendations or crop removal rates.▯ Testing/Nutrient Data Collection▯ On planning units typically 40 acres or larger, soil testing is completed according to LGU recommendations. The use of pre-plant soil tests will assist with the proper development of the annual nutrient budget.▯ The use post-harvest of soil tests (results interpreted by crop consultant) will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N, thus reducing the potential for off-site impacts. ▯ Producer Activities/Equipment Needed▯ Records are maintained annually documenting current soil test, analysis, amount of application, forms and rates of nutrients for each field, including post harvest analysis. ▯ Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

Scenario Feature Measure:

Scenario Typical Size:

40

Acre

Tot Unit Cost

\$14.18

Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Test, Soil Test, Standard	2	Each	\$9.53	\$19.06
Equip./Install.	Truck, Pickup	1	Hour	\$27.28	\$27.28
Labor	Specialist Labor	6	Hour	\$79.60	\$477.60
Labor	General Labor	2	Hour	\$21.56	\$43.12

Total Cost: \$567.06

Payment types:

PayType	Unit Payment	PayType	Unit Payment
EQIP	\$10.63	EQIP-HU	\$12.76
EQIP-NOI	\$10.63	EQIP-HUNOI	\$12.76
EQIP-MRBI	\$10.63	EQIP-HUMRBI	\$12.76

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Scenario # 2 Basic NM with Manure

Missouri

Scenario Description:

This scenario describes the implementation of a basic nutrient management system on cropland or hayland (non-organic and organic) where there is manure or compost application in addition to commercial fertilizer applications. The planned NM system will meet the current 590 standard. Implementation will result in the proper rate, source, method of placement, and timing of nutrients while minimizing off-site degradation or the excessive built up of N and P. Payment for implementation is to defray the costs of soil testing, manure testing, analysis, proper implementation, consultant services that provide nutrient recommendations based on LGU recommendations or crop removal rates and an associated nutrient budget, and recordkeeping. Risk assessments including PI (phosphorus index) and NI (nitrogen index) will be completed with applications of manure completed based on risk results. Records demonstrating implementation of the 4 R's of the NM plan will be required along with copies of risk assessments.

Before Practice Situation:

In this geographic area, a fertility program is either non existent or does not meet the 590 nutrient management standard. Soil testing and manure testing is not completed on a regular basis and applications of nutrients are not based on land grant university recommendations or a nutrient budget. Nutrients and manure solids are transported to surface waters through runoff or erosion or to groundwater through leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fields have little or no erosion protection often times resulting in wind, sheet, rill, and ephemeral erosion.

After Practice Situation:

Plan Development A nutrient management system that includes manure as a source will be developed to meet the NRCS 590 standard. The development and implementation of a nutrient management plan (NMP) will benefit plant productivity and reduce off-site degradation. A nutrient management budget will be developed for each field(s) based on soil tests and manure test analysis along with land grant university recommendations or crop removal rates.**Testing/Nutrient Data Collection** Soil testing is completed according to LGU recommendations. The use of pre-plant soil tests will assist with the proper development of the annual nutrient budget. Applications of manure are based on risk assessments (PI - phosphorus index). The use of post-harvest soil tests (results interpreted by crop consultant) will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N. The use of Pre side-dress soil nitrogen test (PSNT) or a Pre Top Dress Tissue test (PTDTT) prior to the rapid biomass growth of the plant will assist the producer in evaluating the mineralization of Nitrogen from manures / cover crops in providing adequate nitrogen to meet the crop requirements, thus reducing the potential for off-site impacts.**Producer Activities/Equipment Needed** Records are maintained annually documenting current soil tests, manure tests, analyses, amount of application, forms and rates of nutrients for each field, including post harvest analysis. Applications will be completed in a manner that minimizes nutrient runoff and leaching or build up of excess nutrient concentrations.

Scenario Feature Measure:

Scenario Typical Size:

40

Acre

Tot Unit Cost

\$21.76

Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Test, Manure Analysis	1	Each	\$43.06	\$43.06
Materials	Test, Soil Test, Standard	2	Each	\$9.53	\$19.06
Equip./Install.	Truck, Pickup	1	Hour	\$27.28	\$27.28
Labor	Specialist Labor	9	Hour	\$79.60	\$716.40
Labor	General Labor	3	Hour	\$21.56	\$64.68
				Total Cost:	\$870.48

Payment types:

PayType	Unit Payment	PayType	Unit Payment
EQIP	\$16.32	EQIP-HU	\$19.59
EQIP-NOI	\$16.32	EQIP-HUNOI	\$19.59
EQIP-MRBI	\$16.32	EQIP-HUMRBI	\$19.59

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Scenario # 3 Enhanced NM

Scenario Description:

Missouri

This scenario describes a conventional cropping system where either no nutrient management or only a basic level of nutrient management is being practiced. An enhanced nutrient management system includes activities such as split applications, multiple nutrient concentration tests (other than only soil tests) and methods that more concisely enable scheduling of appropriate fertilizer applications. Nutrients are transported to surface waters through runoff or wind erosion in quantities that degrade water quality and limit use of intended purposes. Inefficient energy utilization occurs due to traditional methods and forms of fertilizer applications.

Before Practice Situation:

In this geographic area, conventional fertility programs involve very little or no soil testing. Application of fertilizers and amendments, are completed annually based upon tradition that does not specifically consider the detrimental affects of improper timing or rates of nutrients, or excess nutrient build-up in the soil. Fields are overwintered with little or no erosion protection often times resulting in sheet, rill, and ephemeral erosion by spring. Runoff flows into adjacent streams, water courses, tile drains, field surface drains, or other water courses causing degradation to receiving waters or leaching of nutrients to shallow ground water sources. There is typically no environmental evaluation of the potential for off-site movement. Soil quality may also be detrimentally affected. The current system is also typically inefficient energy user due to traditional methods, forms, and amounts of nutrient applications.

After Practice Situation:

Plan Development: The development and implementation of a Nutrient Management Plan (NMP) will benefit plant productivity and reduce off-site movement of nutrients. The NMP will stress the use of the four R's (Right Source of Nutrients, Right Time of Application, Right Rate, and Right Method of Application). These include practices such as use of split applications, slow release nutrients, proper timing of application, more appropriate formulations, banding, etc. A nutrient budget is developed for each field or section of field annually. Further minimization of risk is accomplished by identifying the variability across the field(s) by using soil survey maps or other simple techniques to establish zones, along with zonal soil testing. Testing/Nutrient data collection: The use of pre-plant soil tests will assist with the development of the annual nutrient budget in accordance with Land Grant University fertilizer guides. Soil testing is completed according to LGU recommendations. Use of a post-harvest soil test (interpreted by a crop consultant) will help establish the adequacy of the plan in meeting crop needs while minimizing P application rate and residual N, thus reducing the potential for off-site impacts. Analysis are completed at least once every three years for N-P-K (soil tests). Producer Activities/Equipment Needed: Applications of nutrients are completed using a GPS guided variable rate fertilizer applicator. Application of nutrients via fertilizers, and/or manures applied in a manner that minimizes nutrient runoff and leaching. Application rates of all sources of nutrients are based upon soil tests and either LGU recommendations, crop removal rates, or industry standard. Record keeping will document application of nutrients based on the 4 R's. Nutrients are applied at rates based on soil test zone analyses. The producer will attend training of "crop school or nutrient management workshop" or similar activity annually to stay current on crop-specific nutrient management.

Scenario Feature Measure:

Scenario Typical Size:

40	Acre	Tot Unit Cost	\$44.97
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Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Test, Soil Test, Precision, Grid or Zone	15	Each	\$12.45	\$186.75
Equip./Install.	Truck, Pickup	2	Hour	\$27.28	\$54.56
Equip./Install.	All terrain vehicles, ATV	2	Hour	\$29.82	\$59.64
Equip./Install.	Fertilizer, precision application	40	Acre	\$12.29	\$491.60
Labor	Specialist Labor	8	Hour	\$79.60	\$636.80
Labor	General Labor	2	Hour	\$21.56	\$43.12
Acq. Tech. Kno\	Transportation	60	Mile	\$0.56	\$33.60
Acq. Tech. Kno\	Training, Registration Costs	1	Each	\$176.25	\$176.25
Acq. Tech. Kno\	Training, Workshops	1	Each	\$116.67	\$116.67

Total Cost: \$1,798.99

Payment types:

PayType	Unit Payment	PayType	Unit Payment
EQIP	\$33.73	EQIP-HU	\$40.48
EQIP-NOI	\$33.73	EQIP-HUNOI	\$40.48
EQIP-MRBI	\$33.73	EQIP-HUMRBI	\$40.48

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Scenario # 4 Enhanced NM with Tissue Testing

Scenario Description:

Missouri

This scenario describes the implementation of an advanced precision nutrient management system on cropland. The planned NM system will meet the current 590 standard. Payment for implementation is to defray the costs of soil testing, analysis, consultant services, skilled labor and specialized nutrient application that provide nutrient proper recommendations based on LGU recommendations or crop removal rates and an associated nutrient budget, recordkeeping, and monitoring on a precision level that includes split applications, NDVI sensing, and aerial imaging. Records are kept demonstrating implementation of the 4 R's of the NM plan. This scenario goes beyond the enhanced system by using technologies that improve efficiency and effectiveness of nutrient management by utilizing specialized precision techniques and tools (variable rate applicators, NDVI, aerial photography, yield monitoring,, plant tissue testing). Precision nutrient mgmt techniques ensure that the right rate, proper timing, and proper placement of nutrients minimize non-point source pollution and provide proper amounts of nutrients to the crop where it is needed and not applying where it is not needed.

Before Practice Situation:

In this geographic area, a fertility program is already in place, however, application of nutrients across large acreages is based on a lack of representative soil samples or analyses. The current NM system may or may not meet 590 standards, however, could be improved by reducing energy inputs and utilizing precise mapping and diagnostic equipment. Because whole fields are often fertilized with the same rate, excess nutrients may be applied in some areas while inadequate amounts of nutrients are applied in other areas. Excess nutrients are transported to surface waters through runoff or erosion or to ground water from leaching in quantities that degrade water quality and limit use of intended purposes. Soil quality may be degraded by excess or inadequate nutrients. Fertilizer applications are made in their entirety more than 30 days prior to planting. Applications do not consider the detrimental affects of improper timing or improper rates. Whole fields with like crops and rotation are fertilized the same.

After Practice Situation:

Plan Development☐ An application rate (prescription) is developed for each zone based on representative soil analysis and a zone nutrient budget.☐ A nutrient budget is developed for each field annually.☐ Yield monitoring maps will be collected and utilized (where technology allows) to develop the following year nutrient applications.

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Testing/Nutrient Data Collection☐ Soil testing is completed in a fashion that provides a representative assessment of nutrient concentrations in each field or planning unit including zone directed sampling, real time NDVI (normalized differenced vegetative index) sensing, EC Index type sampling, or via high definition aerial photography that allows for the identification of numerous variations (zones) in a planning unit. ☐ Zone maps are created and a nutrient budget developed for each zone.☐ Soil testing is completed annually for N and at least once every three years for P-K. Plant tissue samples collected and evaluated.☐ Producer Activities/Equipment Needed☐ Application of nutrients is completed so that non-point source pollution is minimized.☐ Nutrients are applied based on realistic yield expectations.☐ The average field size is >=40acres.☐ Applications of nutrients are completed using a GPS guided variable rate fertilizer applicator.☐ Applications of nutrients will be completed in split applications where a majority of the N needs are applied based on the needs of the crop based on growing season requirements.☐ Advanced training may be needed to effectively implement the practice. ☐ Producer attends training courses and use specialized labor where needed in the annual maintenance of the NM plan. ☐ Record keeping will include all soil tests, analysis, zone maps, nutrient prescriptions and budgets, and as-applied applications. ☐

Scenario Feature Measure:

Scenario Typical Size:

40	Acre	Tot Unit Cost	\$71.84
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Cost Category	Component Name	Quantity	Unit	Unit Cost	Cost
Materials	Test, Plant Tissue Test	1	Each	\$24.61	\$24.61
Materials	Test, Soil Test, Precision, Grid or Zone	15	Each	\$12.45	\$186.75
Materials	Test, Soil Nitrogen Testing	1	Each	\$14.59	\$14.59
Equip./Install.	Chlorophyll Reader	40	Acre	\$11.20	\$448.00
Equip./Install.	Truck, Pickup	4	Hour	\$27.28	\$109.12
Equip./Install.	Fertilizer, precision application	40	Acre	\$12.29	\$491.60
Equip./Install.	All terrain vehicles, ATV	4	Hour	\$29.82	\$119.28
Equip./Install.	Satellite imagery, aerial photography, infrared	40	Acre	\$0.12	\$4.80
Labor	Specialist Labor	12	Hour	\$79.60	\$955.20
Labor	General Labor	6	Hour	\$21.56	\$129.36
Labor	Skilled Labor	2	Hour	\$31.91	\$63.82
Acq. Tech. Kno\	Training, Registration Costs	1	Each	\$176.25	\$176.25
Acq. Tech. Kno\	Training, Workshops	1	Each	\$116.67	\$116.67
Acq. Tech. Kno\	Transportation	60	Mile	\$0.56	\$33.60

Total Cost: \$2,873.65

Payment types:

PayType	Unit Payment	PayType	Unit Payment
EQIP	\$53.88	EQIP-HU	\$64.66
EQIP-MRBI	\$53.88	EQIP-HUMRBI	\$64.66